

Identification and suggestions of emerging technologies for a smart warehouse

By Xinchuan Li and Monish Ashok Kumar, Division of Engineering Logistics

The importance of warehouses in the contemporary age has increased a lot due to the higher scale of demand and requirements of the customers. Under this circumstance, emerging technologies from Industry 4.0 are being implemented in the warehouses around the globe to improve warehouse operations and its performance enabling higher efficiency of warehouse activities. Although there are challenges, the benefits of these existing technologies have still made significant progress in the functioning of warehouses in the world. Therefore, smart warehouses have become imminent in the logistics industries that aims to enhance warehouse performance.

This study first aims to research and identify new technologies in the warehouses and their benefits to warehouses in the recent years. It will also cater to find the specific and popular technologies which are prevalent in warehouses in the light of smart technologies. Lastly, the paper intends to discover the benefits and challenges of the identified technologies and recommend suggestions for the technologies in a smart warehouse. To fulfill the aim of the study, the thesis has used a structured literature review as the research methodology to achieve the research objectives. Sources of data for the study are collected from academic journals, books, videos, and websites pertinent to latest warehouse technologies. These sources are utilized together to gather enough information in order to accurately arrive at the relevant technology to be investigated.

The identification of new technologies, particularly digital technologies and the merging of digital and physical technologies, is the study's initial conclusion. AI and virtual technology, such as VR and AR, IoT, 5G, Blockchain, and Cloud Computing, are examples of digital technologies. Combination of digital technology with AGV, AS/RS, and robots are also discussed. The study's second conclusion is a set of recommendations for a smart warehouse, which are based on an analysis of the challenges and benefits of the identified technologies in a smart warehouse. Some of the challenges which could be overcome through the identified technologies are lack of privacy, high labour costs, low picking accuracy, better connectivity with IoT devices and many more. The suggestions are given for various warehouse activities and regions, such as inbound and receiving, put-away, storage, picking, packing, and shipping. Suggestions of technologies that would improve network coverage, safety and maintenance are also provided.

The study presents the classification of the emerging technologies in different areas of smart warehouses after analysing the challenges and benefits of identified technologies. Therefore, this research has contributed to achieve better knowledge about the new technologies in smart warehouses and means to improve warehouse performance.